

IAC Mission Success Stories

Please visit other DTIC
IAC Mission Success Pages
by following these links...

AMPTIAC
CBUNG
CPHA
DAGS
HSHAC
MTRAC
MRIA
MRSIAC
MSTIAC
MTIAC
RAC
SURTAC
WSTIAC

Please visit other Military
IAC Mission Success Pages
by following these links...

APMIAC
CEIAC
CRSTIAC
CTIAC
DTRIAC
EIRAC
HEIAC
SARVAC
SRIAC

Defense Technical Information Center
ATTN: DTIC-A
8725 John J. Kingman Road, Suite 0944
Fort Belvoir, VA 22060-6218
Commercial: 703.767.9122
DSN: 437-9128
FAX: 703.767.9119
E-mail: ic0001@mail.dtic.mil



Chemical Propulsion Information Agency

CPIA

Story 1

Story 2

CPIA Contributes to International Space Station Propulsion System Design

The International Space Station is a significant and technically demanding, multinational space program with team members consisting of the United States, Russia, Canada, Japan, and a European consortium. The Naval Center for Space Technology (NCST) of the Naval Research Laboratory (NRL) has been tasked by the National Aeronautics and Space Administration to provide a propulsion module for attitude control (spacecraft pointing and control) and reboost (altitude increase/orbit adjustments) of the ISS. The interim control module (ICM) is being developed in response to this requirement. The ICM could be used as early as the third assembly element of the ISS and will be preceded by the Russian-built FGB (function cargo block, currently called Zarya) and U.S. node 1.

Continued on Story 1

Liquid Explosives Safety

CPIA recently completed a study for the Department of Defense Explosives Safety Board (DDESB). The project studied issues and developed revised safety standards concerning explosives equivalence (TNT Equivalence), hazard classification, and quantity-distance (Q-D) criteria for liquid propellants and related energetic liquids, as well as site planning of liquid bipropellant system launch and static test facilities. Included in the task and fundamental to the program were tasks to review liquid propellant accident and realistic large-scale test data, and review other guidelines used in the commercial sector for application to liquid propellants.

Continued on Story 2

Please visit our Web site at <http://www.cpia.jhu.edu> or send us an E-mail at cpia@jhu.edu

IAC Mission Success Stories

Please visit other OTIO
IAC Mission Success Pages
by following these links...

AMPTIAC
CBIIAC
CPIA
DACS
HSSAC
LNTAC
IRIA
IWS IAC
INTIAC
MTIAC
RAC
SURVIAC
SWIAC

Please visit other Military
IAC Mission Success Pages
by following these links...

APMIAC
CEIAC
GRSTIAC
GTIAC
OTIAC
EAC
HEIAC
SAIAC
SWIAC

Defense Technical Information Center
ATTN: DTIC-M
6725 John J. Abington Road, Suite 6944
Fort Belvoir, AZ 22860-6216
Commercial: 703.767.5820
OSN: 421.9120
FAX: 703.767.5119
E-mail: ic@dtic.mil

CPIA

Chemical Propulsion Information Agency

CPIA

Story 1

Story 2

CPIA Contributes to International Space Station Propulsion System Design (continued)

The ICM represents a timely, cost-effective, and technically responsive contingency solution to temporarily replace the Russian service module (RSM). The RSM was to provide the initial habitable area as well as to supplement the FGB for attitude control and reboost. The ICM replaces the RSM and provides for the uninterrupted assembly of the ISS.



Figure 1: ICM
Tanks

CPIA assembled, analyzed, and forwarded pressurant/propellant solubility data to NRL to support propulsion system design and operational analyses for the ISS. The space station encounters a range of temperature change as it orbits the Earth and transitions from sunlight to shadow. The temperature change affects the equilibrium condition of pressurant gas and propellant within the Interim Control Module propellant tanks (See Figure 1) and causes the tank pressures to fluctuate. Precise determination of the amount of helium gas saturation in the ICM fuel and oxidizer over the temperature range of interest is necessary to maximize propellant load capability and propulsion system design and operational parameters.

CPIA provided helium solubility, saturation, and saturation rate data in monomethylhydrazine fuel and nitrogen tetroxide oxidizer for equilibrium and nonequilibrium conditions so that NRL propulsion engineers could accurately calculate the maximum propellant for the ICM propulsion subsystem. The data also formed a part of the analysis to calculate propellant tank pressures over the flight temperature range and for various usage profiles. From this data NRL propulsion engineers were able to optimize the system operating pressures over the life of the spacecraft for the man-rated propulsion system.

Please visit our Web site at <http://www.cpia.jhu.edu> or send us an E-mail at cpia@jhu.edu

IAC Mission Success Stories

Please visit other OTIC
IAC Mission Success Pages
by following these links...

AMPTIAC
CBIIAC
CPIA
DACS
HSSAC
HSTAC
IRIA
IWS IAC
INTIAC
MTIAC
RAC
SURVIAC
WSTIAC

Please visit other Military
IAC Mission Success Pages
by following these links...

APMIAC
GEIAC
GRSTIAC
GTIAC
OTIAC
EAC
HEIAC
SAIAC
SWIAC



Defense Technical Information Center
ATTN: DTIC-AM
6725 John J. Hughes Road, Suite 6944
Fort Belvoir, AZ 22860-6216
Commercial: 703 767 5820
DSN: 421 5120
FAX: 703 767 5119
E-mail: ic2@dtic.mil



Chemical Propulsion Information Agency

CPIA

Story 1

Story 2

Liquid Explosives Safety (continued)

The data generated in these activities formed the basis for proposed revisions to current standards. In addition, CPIA coordinated the deliberations of an interagency advisory board, the Liquid Propellants Working Group (LPWG), which provided oversight in the assessment of available information with respect to historical and operational requirements, and ultimately the formulation of final recommendations for a proposed change to DoD 6055.9-STD "DoD Ammunition and Explosives Safety Standards." The LPWG also provided expert advice to the DDESB concerning launch site planning for the highly visible Air Force Delta IV Evolved Expendable Launch Vehicle (EELV) program. Details on the rationale for the program as well as technical information developed from the accident and test review, with respect to hazards controlling quantity-distance criteria for liquid propellants and propulsion systems, have been published in a variety of CPIA publications, and JANNAF and DDESB conference proceedings.



Please visit our Web site at <http://www.cpia.jhu.edu> or send us an E-mail at cpia@jhu.edu

